

RAVEN TRAINING SERIES

The RAVEN Training Series is a three part approach to RAVEN indoctrination. This manual presents the basic level training for RAVEN version 4.1a. The objective is to relay an understanding of how the RAVEN tool supports the resolution process and how specific tasks are performed within version 4.1a. The materials endeavor to express the vision of the reengineered resolution process. Intermediate RAVEN Training Courses addressing high profile issues in a concentrated format are the second phase of the Series. Intermediate course topics will include Taking Inventory (Acquisition and Manipulation of Bank Data), Repackaging the Inventory (Structuring, Marketing, Bid Analysis), Valuation (Sample Pulls, Credit Analysis, Pricing, Extrapolation), and Managing the IP/AVR Project. The emphasis will be on obtaining a level of understanding that allows intricate problem solving. An Advanced Training conducted in a simulation style completes the instruction. The goal is to pull together the previous course material employing hands-on techniques and student decisions.

This Basic Resolution & RAVEN Training Manual is designed to enhance classroom instruction and as a self-paced, modular study guide to teach how the current version of the RAVEN software supports the resolution process. Its design may also prove valuable as a reference book to be used in the field for problem solving.

The instruction and study materials are formatted to provide an explanation of “the what and why” of each topic followed by a self-paced exercise and keystroke answer key for the exercise. A separate summary exercise provides a more seamless exhibition of student skills.

Keep in mind that the sessions within and among the courses are necessarily sequential, one following another, but the different components of the resolution functions occur simultaneously during a resolution. This series is not intended to teach how to start on the left and work to the right. RAVEN is flexible and it is expected that the student will reach that level of understanding of the Process and Tool that allows the flexibility to work through the unique situations presented at each failing institution. Think of the RAVEN software as a data manager with engines for Tracking/GL, Modeling/Structuring, Sampling/Valuation, and Reporting.

History of the IP/AVR Process

During the 1980's, a failing bank was marketed by the Division of Bank Supervision (DBS), predecessor of the Division of Supervision (DOS), with the liquidation value of the assets estimated by the Division of Liquidation (DOL), predecessor of the Division of Depositor and Assets Services (DAS) and the Division of Resolutions and Receiverships (DRR). DBS would look for potential bidders for the failing bank and prepare the IP, followed by DOL's AVR (TAPA Review). DBS designed and negotiated the assumption agreement and analyzed the bids received to select the winning bidder to present to the FDIC Board of Directors for approval. DOL handled the physical closing, including the inventorying of assets and deposits, and their division between what would remain with the receivership/conservatorship and those transferred to the acquiring entity, if applicable. The IP/AVR process was necessarily project oriented, performed by separate teams with the AVR project typically following the IP project. The IP presented one view or structure of the failing bank's assets. The AVR was performed using singular cash flow analysis, that is, all cash flows were assumed to occur in the month of liquidation. Only cash inflows were estimated by the reviewer, with direct expenses and FDIC overhead provisions made on a single percentage adjustment. Valuation techniques approximating DOL's abilities to bulk sale assets evolved late in the decade. As occurs today, resources of personnel, space, and time were not always adequate to allow a 100% review of the assets of a failing institution, therefore a method of sampling asset groups was established. Generally, the sampling methodology was an intuitive 25% of performing assets and 50% of non-performing assets. Extrapolation techniques were not always statistically valid. Valuation assumptions used during the AVR were largely made by the individual file reviewers. The assumptions were captured off-line from the software generating the reports, in the work papers of the project.

With the formation of the Resolution Trust Corporation (RTC) in 1989, the evolution of the AVR process progressed. The IP/AVR process continued to be project oriented with sequential tasks performed by separate teams. Within a year, a single deal structure was presented in the IP with offerings of optional pools. The RTC's sampling method appeared to be intuitive, however they developed a sampling matrix that required different sampling percentages based on asset size, type, and performance. Again, valuation assumptions were largely captured off-line and maintained in the work papers.

In 1991, DOL and DOS were figuratively split apart and DOR was created in the space to take on responsibilities from both Divisions. IP preparation, taken over from DOS, was largely being done by DOR staff by late 1991. Toward the end of 1991 and early 1992, a project team was formed consisting mainly of DOR Assistant Regional Managers to create and document the DOR's IP and AVR policies and methodology. This project was completed in April 1992 with the adoption and issuance of the IP/AVR Manual. Shortly thereafter, DOR took on the responsibility of preparing its own AVRs, a task that had continued to be performed by DOL to that point. The IP and AVR methodology, which DOR inherited from DOS, DOL, and RTC, and modified to its use, continued the view of sequential, separate projects. In most of the DOR regions, this consecutive project framework was supported by specialized teams with separate skill sets: accountants and bank

operation personnel preparing IPs and credit review/appraisers staff preparing the AVRs. A major modification of DOL and RTC methodology was the creation of a multi-period cash flow analysis and the itemization of the sources of income and expenses in that analysis. Additionally, concepts of valuing appropriate assets based on a bulk sale scenario were refined and implemented. A single loan structure was set for presentation in the IP, based mainly on broad loan types: Commercial and Industrial, Consumer, and Real Estate. The IP was completed off-site while the second team remained on-site performing the AVR. Problems ensued because the first validation of the bank's loan detail data did not occur until the commencement of the AVR. This validation timing caused either retroactive adjustments to the IP or reconciling schedules to tie the IP and AVR. Additionally, valuations of the categories were based on well-intentioned, albeit unscientific sampling and extrapolations. Valuation assumption information continued to be collected, captured on one Lotus spreadsheet to be manually input in other Lotus spreadsheets.

An IP/AVR Improvement Project Team was formed in early 1993 to review the inherited and modified DBS/DOL/RTC process. The team was challenged to increase the process' flexibility to structure multiple transactions, provide for more rapid decisions in illiquid failing bank situations, prepare more usable data to potential acquirers, capitalize on prior valuation/liquidation experience, and assure greater quality through integrated management. The results of this team's efforts were the reengineering of the resolution process (to be discussed in the next section) and the design and coding of the software to support the process entitled RAVEN (Risk Analysis and Valuation Estimation). The first version of RAVEN, Version 1.0, was released 31 March 1994.

The reengineered IP/AVR methodology supported by RAVEN views the steps of a failing institution's resolution as an iterative process that may be accomplished by a single team, as opposed to separate projects that followed one another. The multi-period cash flow analysis or bulk sale valuation through loan pricing models were retained and extrapolation techniques refined. The sampling conventions adopted were cumulative, valid, and supportable. The RAVEN system allows any number of deal structures to be designed permitting "what if" games and easier analysis of "nonconforming" bids. All structures created may be captured in the system to be recalled later. Because the sampling is cumulative, each structure may be valued efficiently using data captured from previous sample pulls and file reviews. Additionally, the confidence and precision level of the estimated recovery value for each pool in a structure is calculated. Valuation assumptions are captured within the system where they are retrieved automatically for use in the Cash Flow Worksheets and Loan Pricing Models.

In early 1995, the Chief Financial Officer commissioned the Standard Asset Value Estimation (SAVE) Task Force to address the problem of inconsistent valuation techniques applied by the various Divisions within the FDIC. The objectives of the task force were to:

- 1) identify the needs, requirements, and uses for asset valuations across all Divisions,
- 2) identify the technical composition of the existing systems supporting the various asset valuation processes,
- 3) develop an asset valuation program that can be consistently used by each Division, and
- 4) establish uniform assumptions and methodologies regarding discounts rates, disposition expenses, collateral appraisal validation, holding periods, etc.

On April 26, 1996, the SAVE Task Force made the following recommendations which were accepted by the Project Board: First, that discounted cash flow valuation models would be employed. These would consist of a standard Loan Pricing Model for assets with a regular payment stream, a standard Cash Flow Worksheet Model for those assets with irregular streams, and a formal Decision Tree to determine which of these valuation models to employ for individual assets. Second, that a standardized, centrally collected National Assumptions Reference Library (NARL) would be created. The NARL would contain asset specific assumptions for direct income and expenses of asset ownership and disposition, and non-asset specific assumptions related to Corporate and receivership overhead. Third, the Corporation would utilize a Liquidation Scenario in asset valuations, as opposed to a “most likely” scenario. Fourth, that for financial reporting purposes, the SAVE valuation models, SAVE assumptions, and statistically valid efficient sampling and estimation process would be employed.

With minor modifications to the RAVEN application, the IP/AVR process came into compliance with the SAVE recommendations. These modifications were coded in RAVEN v4.1a.

The Resolution Process

In the past, the process of resolving a bank largely followed a sequential course with events, projects, or tasks completed in a forced chronology. In this product view, a download was obtained, IP prepared, AVR performed, and bids received and processed through the Least Cost Determination (LCD). This method did not allow for the lack of quality of the bank’s data, visionary and flexible packaging of the failing bank’s assets for resale, or the efficient turnaround of bid analysis. As new information became available, or a different packaging of the assets was explored, the whole process (i.e., IP, AVR, and LCD), would have to recycle, involving extensive time and expense.

For example, while preparing the IP, it was realized that important information was missing from the download, the loan schedules would have to be adjusted and reassembled. The downloaded information would have to be adjusted to recreate and support the revised IP loan schedules. As another example, assume that after the IP team had completed their project, the AVR team discovered during the credit file review process that some loans were not categorized properly, the IP would have to be revised, sample sizes adjusted, new samples pulled, revised loan summary sheets created involving rerunning loan pricing models, and the downloaded information adjusted in order to be able to recreate and support the revised IP Loan Schedules.

The product approach was structuring the “conforming” transaction presented to potential bidders prior to having confidence in the data. Also, marketing’s input was largely obtained in mid-process, after receiving the field prepared IP.

The IP/AVR Improvement Project Team formed in early 1993 and working through early 1994 reengineered the resolution process. All of the functions and tasks remained from before, however, they were organized so that the resolution was completed in a desirable manner. In fact, the resolution process is an iterative one in where files are reviewed, more is learned about the assets, and more confidence is gained in the data supplied by the bank, and thus more perfect information may be available to structure the “conforming” transaction presented in the IP. It was important for the IP/AVR Improvement Project Team to recognize and understand this recursive process view prior to developing the RAVEN supporting system and tool. The IP and AVR became reports (not projects) that are generated when a satisfactory level of confidence in the data is achieved. The employment of database software technology fostered the use of scientific statistical sampling and analysis to quantitatively determine when a satisfactory level of confidence was achieved.

For this process perspective, please refer to the appendix, **The Failing Institution Resolution Paradigm**, which provides a framework for an understanding of the interrelated, concurrent nature of the resolution functions and tasks. There are three major functions that must occur in the resolution of a failing financial institution: Preparing the Failing Institution for Resolution, Marketing the Failing Institution, and Selecting Winning Bidder(s). These functions are accomplished via major tasks: Taking inventories of the assets and liabilities of the failing institution (Preparation); Repackaging of the inventories, presenting them to potential bidders, and conducting Due Diligence visitations (Marketing); Accepting bids, Analyzing those bids (including valuing the asset inventory, determining the uninsured deposit exposure, and determining the least costly bid(s)) (Selecting Bid(s)). These functions and tasks are the same as what had to happen since the days of DOS and DOL’s direct involvement. The chronology is different. Tasks performed sequentially, are recognized to occur simultaneously. This concurrent approach to the IP and AVR provides flexibility to improve packaging of the failing bank’s assets as more information becomes known about the assets. That is, the more we find out about the loans through successive sampling and file review, the better we are able to evolve an optimal structure and provide bidders with quality information. It is an iterative and step wise validation and valuing process.

Preparing the Failing Institution for Resolution - Taking Inventory

Preparing the failing institution for resolution is the process of capturing and validating the data received. Data capture is accomplished both electronically and manually. Typically, loans, deposits, and occasionally other real estate owned subsidiary ledgers are obtained on a tape or disk from the servicer or internal data processing department. This information is converted to a personal computer usable format and selected fields are transferred to a database that will be “loaded” into RAVEN. Overdrafts contained in the **Deposit** database are automatically transferred to the **Overdraft** database when the deposits are loaded. Manual input to RAVEN is required of the bank’s general ledger prepared for the “as of” date, with the non-loan asset subsidiary ledger accounts and other liability/equity ledger accounts being transferred by the user to their proper database.

The data validation process assures the quality of the inventories gathered. Completeness of the financial record data captured (inventory) is determined by comparisons to check figures or control totals throughout the process. In general, initially, the download for loans (which may be manually input) and deposits are compared to the check figures provided with the tape/disk(s). This comparison indicates that all the information sent by the institution through electronic transfer was received. In many cases, a hard copy of the general ledger and loan and/or deposit subsidiary ledger trial balances that were generated for the “as of” date are received.

Comparisons may be made between the electronic data totals after the tape/disk has been “converted” into a readable format and the hard copy general ledger control account balances and/or subsidiary ledger totals. The institution’s general ledger is manually entered into RAVEN’s **General Ledger** module and is then compared to the institution’s source document to assure accuracy of input. An “image” file is created from the electronically received loan data. This file may be loaded into RAVEN and then comparisons made between the loan balances in the various categories to the bank’s general ledger balances input in RAVEN. When these numbers exactly match, the repackaging process may commence. Throughout the resolution process, even through recategorization of loans, the DOR adjusted general ledger balances in RAVEN must tie to the RAVEN subsidiary ledgers to maintain evidence of the completeness of the data.

Once the loan and deposit data is loaded into RAVEN, an audit is performed to test various fields for the reasonableness of the data contained in them. As an example, maturity dates far in the future may be identified and listed by RAVEN for team member review for accuracy.

Additionally, for asset categories with large numbers of records (i.e., loans), review for accuracy of data received is accomplished via a statistical sample of the files. The attributes of the sampled files, as revealed in the source documents, are compared to how the institution has recorded those assets on the general ledger or, if appropriate, subsidiary ledgers. In the case of loans, this same sample is also used for value estimation purposes. For asset categories with low numbers of items, copies of supporting records (source documents) are accumulated and compared to recorded data. As an example, the general ledger category, Due From Banks, may be supported by gathering the daily statements from the various depository institutions and copies included in the FDIC work papers.

It is important that throughout the resolution process, the supporting data accumulated exactly supports the financial records. Any unexplained discrepancies need to be brought to the attention of DOR management. Fraud or mismanagement may have been inadvertently discovered which may have serious repercussions on how the institution is marketed. DOR is not engaged to audit the institution's financial statements, however, some judgment is necessary to determine the extent to which DOR resources should be expended to trace unexplained differences. A reasonable effort should be made and documented.

Marketing the Failing Institution - Repackaging and Presenting the Inventories and Conducting Due Diligence

The function of marketing the failing bank involves the identification and solicitation of qualified potential bidders and providing information to those possible bidders to entice them to seriously consider performing their "due diligence" on the failing institution. Currently, the Division of Supervision (DOS) provides DOR with a list of potential financial institution acquirers. Entities in this group would likely be approved by DOS to make an acquisition of all or parts of the failing institution, depending on specifics of the acquisition. The marketers contact the entities on the list and invite them to an Information Meeting. Providing information to potential bidders begins with the Information Meeting and distribution to the attendees of the Open Section of the IP along with legal and other documents detailing the anticipated deal structure. The Open Section of the IP is a prospectus providing a description in financial terms of the failing bank's transferable assets and liabilities on the "as of" date with supporting schedules and analysis. Resolution transaction options, such as optional pools, may also be included with this information. In the process of preparing the IP, judgements must be made as to how the assets will be presented to the prospective acquirers. Principally, the loan portfolio may be rearranged (repackaged) to reflect what the marketer knows about the market to which the failing institution is being exposed. The DOR person responsible for marketing must be cognizant of what loan characteristics have been favorably received by acquirers in other failing institution resolution cases.

The repackaging of the loan inventory occurs within RAVEN using the **Structure** module. Any number of structures may be created and saved here. Each structure contains all the loans of the bank and differs from other structures only in the way the loans are arranged into groups, or pools. In statistical terms, pools are populations of interest from which samples will be pulled. Pools are defined by their components which are characteristics or attributes of the individual loans (i.e., 1-4 Family Loans, or Consumer Loans, or Loans in a zip code area, or combination).

From iterative structures, the “conforming” structure to be presented in the IP evolves. The progression of the IP/AVR project would generally follow these steps:

- Start with a relatively unrefined pool,
 - One pool which contains all the loans of the bank
 - Pull a sample and begin file review
 - Test the attributes of the banks recorded data
 - Value the sampled loans
 - Provide feedback from the first sample pull revealing information about the loan portfolio
- Refine the next structure
 - Pools of consumer, commercial and industrial, and real estate loans
 - Pull a sample from this structure for file review
 - Learn more about the portfolio from that review
- Continue refining the structure until reaching the one used to market the institution.

In this fashion the marketer uses increasingly accurate information about the loan portfolio along with their prior knowledge and experience to identifying ways to market the institution. Eventually, through successive structures, confidence evolves in the massaged loan data and a “conforming” structure becomes apparent. At this time, the IP reports are printed. The Information Meeting is held and certain of these IP schedules are used to present the repackaged inventory to the group of potential acquirers. In general, the marketing of a failing institution should follow this course within the reengineered resolution process. Slight regional modifications and adjustments for individual institution circumstances are inevitable. Many details of soliciting bidders, the formalities of the Information Meeting, follow-up calls, “due diligence” practices, etc. have been omitted for brevity. These things have not changed from pre-RAVEN practices.

Selecting the Winning Bidder(s) - Bid Acceptance, Analysis, and Award

Selecting the winning bid that results in the least cost to the insurance fund, as mandated by the FDICIA of 1991, begins with the valuation of the assets of the failing institution. All of the assets are reviewed and a value estimate report is prepared, the Asset Valuation Review (AVR). With the exception of loans, and possibly the other real estate owned (OREO), all items making up an asset category are reviewed and a liquidation value is estimated. For loans and OREO, which are portfolios that may have large numbers of items in them, statistical sampling and analysis are employed to prepare the value estimate. The same sample that is pulled for the loan attribute verification to validate the institution's data is used. To accommodate the iterative loan structuring process, the sampling mechanism was designed to be cumulative. That is, it does not matter for valuation purposes when a sampled loan was pulled during the IP/AVR process, or from which structure/pool it was selected, its value may be properly used in extrapolating a value for the pool in which it resides. This programmed ability allows opportunities to play "what if" games, manage resources during the IP/AVR project, and value non-conforming bids more readily without sacrificing statistical validity. When a sample is pulled Asset Review Sheets (ARS) are generated for the sampled loans and a list of these loans is generated to aid in file acquisition and tracking. From this point, the file review process is much the same as before RAVEN. Generally, it will be determined that the asset should be valued using a loan pricing model (LPM) or Cash Flow Worksheet (CFW). This information is input in RAVEN along with specific valuation assumptions as the project continues. With the solidification of the "conforming structure," and completion of the final ARS/CFWs, the AVR reports are prepared and printed by RAVEN.

The Least Cost Determination analysis normalizes the bids received and compares their respective impact on the insurance fund. In order to analyze bids the LCD must also have input from the IP, AVR, and the Uninsured Deposit Determination and their updates, if applicable. From these inputs, the resolution specialists/financial analysts must select and recommend the least costly transaction or set of transactions, including deposit payout and transfer of assets to the Division of Depositor and Asset Services, from all resolution alternatives.

RAVEN Supports the Resolution Process

This process captures the uniqueness of each failing institution's data and recognizes the difficulties associated with data translation. RAVEN helps capture that data, validate it for completeness, accuracy, and reasonableness, then reshape it for presentation to potential purchasers, and finally, to select the winning bid or combination of bids through normalizing the bids that are received for ease of analysis.

Data capture is accomplished manually through operator keyboard input and automatically through electronic tape or disk downloads, usually of loan and deposit subsidiary ledgers. From whichever source, the asset data is validated for completeness, accuracy, and reasonableness. Completeness validation is accomplished by "tying" the subsidiary ledgers to their respective general ledger categories and, if necessary, reconciling the differences. For purposes of traceability it is important to balance, within RAVEN, the bank's subsidiary ledgers to its general ledger prior to rearranging or repackaging the bank's assets. By making the adjusting entries on-line in RAVEN, an audit trail exists to trace the IP balance sheet and schedules to the institution's general ledger. Attribute validation is the process of testing the institution's records as captured in the downloads, for proper recording of specific attributes of the assets and deposits represented there, i.e., confirming that a loan indicated as a 1-4 Family on the loan subsidiary ledger (loan download) is actually a 1-4 Family loan per the note and credit file. Another validation accomplished in RAVEN through its data audit function is the reasonableness of the data captured. (i.e., sensible maturity dates, etc.)

The valuation of the assets is accomplished by reviewing each item in the categories that typically have a low number of items (i.e., Cash, Due Froms, Fed Funds Sold, Securities, Fixed Assets, Subsidiaries, Other Assets, etc.). In asset categories with larger numbers of items such as Loans, statistically valid sampling routines are performed. A value estimate is calculated on these sampled loans in addition to verifying that the sampled item's characteristics are properly recorded on the bank's books. The results of the value estimation of the sampled items are extrapolated to the population from which they were pulled. Work papers support the entire process.

The marketing staff, in addition to coordinating and overseeing a resolution project, will be instrumental in the design and creation of loan structures. A structure includes all the loans of the bank. Structures differ from each other in the way the loans are subdivided into groups or pools. As the project progresses, samples are pulled from the pools within the then current pro forma structure. As more information is learned about the loans from the resulting file reviews, decisions may be made as to whether or not to offer individual loans or pools and how to present (package) the portfolio to the potential acquirers. In this fashion, subsequent structures are evolved until the one that is to be presented in the IP is apparent. The RAVEN software, developed in the relational database environment, was designed to accommodate the creation and valuation of any number of loan structures, as well as retain them until they are deleted. This work is accomplished through the Structure module of the RAVEN software.

The dynamics of the software also facilitates the analysis of bids received for the failing institution. A bid that does not conform to the marketer's anticipated sale of the assets as presented in the IP may be valued by creating another structure that reflects the "non-conforming" bid. Graduated use of the book value-based sample pull routine in combination with the estimated recovery value confidence and precision levels achieved, allows team leaders to actively manage their limited resources of time, space, and personnel. Additionally, the database format facilitates the transfer of data to recipients outside of DOR (i.e., DAS, bidders).

It is important to note that the process and tool have been designed to be:

- 1) legitimate (free of bias towards a desired outcome);
- 2) defensible (traceable, verifiable, and repeatable); and
- 3) valid (employing accepted statistical sampling and estimation theory and computations).

These were system requirements established early in the development and any unauthorized changes to the software, process, or methodology would be made at the possible peril of these concepts. It is suggested that any perceived improvements to the system identified by users be formally brought to the attention of the RAVEN Users Group or the AVR Methodology Task Force. Both bodies have representatives from each Region.

Support Requirements

The RAVEN software is a FoxPro 2.6 for Windows application. It requires a 386 or higher processor chip, eight (8) megabytes of Random Access Memory (RAM), and, typically, fifteen (15) megabytes of hard disk space in the computer on which it is to be run. At a minimum, this computer will also need the Windows 3.1 software loaded. Because the RAVEN executable program file has the necessary FoxPro code hidden within, it is not necessary to have FoxPro 2.5 (or higher) for Windows loaded. In order to manipulate data outside of RAVEN, it is advisable to have at least one knowledgeable person on-site with FoxPro 2.5 for Windows resident on their machine. Currently, RAVEN is a single user system. The databases may be split, however, this is not advised without close controls. It is anticipated that a future version of RAVEN will be a true multi-user application.

Future Developments

Future RAVEN development is coordinated with the RAVEN Users Group through the use of a database created to track and prioritize user requests. This database captures and tracks program development issues and problems, such as changes in user interfaces that users might prefer or enhancements like multi-user capabilities. These items are prioritized in order to give the developer direction. Any user ideas forwarded to the Analysis and Evaluation Section are reviewed for inclusion in the database.

Control of future releases is accomplished through a three tier system: Maintenance Releases, Update Releases, and Full Version Releases. The objective of a Maintenance Release is to provide quick correction or improvements to critical problems of the program. Things like correcting errant formulas, replacing obsolete report formats, and solving user interface disconnects may trigger a maintenance release. Maintenance releases may be accompanied by updates to the RAVEN Users Manual and are fully compatible with prior versions. A Maintenance Release would be indicated by an alpha character behind the version number. An example would be V1.0a replaces V1.0. An Update Release is a planned release incorporating minor functional enhancements. These releases would include any prior Maintenance Release changes and minor functional enhancements, i.e., additional IP Schedules. Update Releases would be compatible with prior releases and may possibly be accompanied by updates to the RAVEN Users Manual. An Update Release would be designated by a numeric extension, such as V1.1 would replace V1.0a. A Full Version Release, which version 4.0 was, is a planned release incorporating major functional enhancements. This type of release would include all prior Maintenance and Update releases and enhancements such as Multi-user capability, Least Cost Test calculation, and structural changes to the databases. Full Version Releases may not be compatible with prior releases and would likely include an update to the RAVEN Users Manual and training.

Managing the IP/AVR Project with RAVEN

The statistical sampling features incorporated into RAVEN were designed to accommodate proactive management of the resources devoted to a project throughout its life cycle. The three resource constraints for a typical IP/AVR project are time, space, and personnel. Prior to the reengineering of the resolution process and the adoption of a statistically valid, automated random sampling ability, DOR would sample 25% of the performing loans and 50% of the non-performing loans and OREO. This methodology of sampling was intuitive and had no valid statistical foundation.

Within RAVEN, there are three sets of alternative confidence level/intervals to choose from when beginning the sampling process. These confidence level/intervals are labeled Low, Medium, and High and are based on the book values of loans or OREO. Book values are used in the calculations to determine the sample size for a pool, because the book values are all that is known about the assets before a value estimate is complete. After conducting the sampling and valuation process, RAVEN computes confidence (precision) intervals (+/- X%) around the estimated recovery value (ERV) at three confidence levels, 80%, 90%, and 95%.

A recommendation has been made to management that DOR accept preferred minimum target confidence levels and intervals for specific asset types. This would mean that once the minimum targets had been met or exceeded, no additional sampling would be necessary for the subject pool. Specifically, the confidence interval around the ERV is compared to a standard for the types of assets in the pool to determine if further sampling is warranted. The recommendation reads,

- 1) “asset pools that are considered marketable (optional pools, including pools subject to DAS sale within 60 days of closing under Board-delegated authority granted in the resolution case) or that are required to be purchased (overdrafts, for example) should have a confidence interval of plus or minus 10% of the sample Estimated Recovery Value (ERV) at the 95% confidence level; and
- 2) asset pools that are likely to be retained should have a confidence interval of plus or minus 20% of the sample ERV at the 80% confidence level.”

To continue, the following excerpt is taken from the AVR Methodology Modification Recommendation #8:

There is seldom the ability to review every asset in the institution. Therefore, the ERV of all assets must be inferred from a representative sample of the ERVs of individual assets. The estimate of the true ERV of an asset pool has a range of uncertainty around it that can only be stated in terms of probability: There is an X% likelihood that the true value falls within a range. This range is called the X% confidence interval. This range is defined by upper and lower limits within which the true ERV of the asset pool is expected to lie. The X% probability that the confidence interval estimated will enclose the true value is called the confidence level.

RAVEN selects the representative samples from the user-defined asset pools. RAVEN uses measurements of the samples of asset ERVs to calculate 80%, 90%, and 95% confidence intervals for the estimated recovery value of the asset pools. It is important to understand that the RAVEN-designated alternative confidence intervals’ sampling function command labels - Low, Medium and High - are merely labels. One could choose the Low alternative (calculated on book value) and produce a confidence interval, calculated based on estimated recovery values, of 95/5. This usually occurs with a set of assets that are homogeneous in nature.

The RAVEN selection alternatives for sampling are merely tools to start sampling process and to manage sampling resources. If one chooses the Low alternative and does not achieve the needed confidence interval, then one would choose the next level of sampling to tag more assets. This is the process called cumulative sampling. The mission of a good sampling strategy is the optimal allocation of limited file review resources. If one always selects the High alternative for the initial sample, there will undoubtedly be instances of less than optimal use of resources.

The sampling strategy essentially consists of successive sample pulls tailored to resolution structures. Typically, the goal of the first sample is to validate the asset attributes - that is: Are the assets really what the bank says they are? The second sample should be one that ensures a representative distribution of sampled assets across broad asset types such as consumer loans, commercial loans, etc. The third sample will be one that is oriented toward achieving a representative distribution of sampled assets for a particular bid structure, such as a pool of single family adjustable rate loans, a pool of unsecured commercial business loans, etc.

As the resolution team leader becomes more confident in the structure that will be offered, subsequent samples will generate higher actual confidence levels for particular pools. The priority for highest actual confidence is 1) optional pools, 2) required pools, 3) excluded (retained) pools. Within priority levels, materiality is also a factor. For example, given identical confidences and precision intervals on two pools, one with \$150,000 gross book value (GBV) and one with \$15,000,000 GBV, greater benefit can be derived from allocating resources to increase the precision of the \$15,000,000 pool, than from the allocation of an identical amount of resources to increase the precision of the \$150,000 pool.

Tactically, the resolution team leader determines the optimal number of files that can be reviewed by staff subject to the constraints of available working space, personnel, and lead time required by the bank to pull files and project milestones. The team leader compares this number to the available sampling alternatives using the structure modeling feature in RAVEN. If the optimal number is smaller than available alternatives, pools can be subdivided or a high confidence level can be selected. If the number of additional files to review among available alternatives is too large, pools are over specified or the confidence level is too high.

The RAVEN sampling module facilitates more efficient management of resources and produces statistically valid samples. The recommended sampling levels discussed above are simply guidelines. They are the preferred minimum sampling levels. As a matter of course, the Division should strive to sample as many assets as possible. Greater accuracy should be an overriding goal for valuation of all assets whether they are likely to be sold or retained. There are, however, limitations on what can be accomplished. Time, staffing and space constraints will always affect the actual level of sampling. There will likely be situations where these constraints prevent obtaining the preferable minimum levels. This does not mean the values estimated are invalid but rather that there will be a wider confidence interval. Adequate documentation of the circumstances surrounding the resulting sampling level is critical.